

# One-Stage Bilateral Radical Neck Dissection

## Indications and Technique

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BLOCK DISSECTION of regional lymph node areas for metastases is a fundamental procedure in the management of cancer. In no area of the body is such an operation productive of more satisfactory results than in the neck. There are several reasons for this. First, almost invariably when patients die of cancer of the head and neck death is caused by the local effects of the disease rather than by distant metastases. Therefore, the more complete the local operation on head and neck, the better the end-results. Disease in this area is more amenable to early detection and appraisal. Although primary cancer in the mucosal surfaces of the head and neck frequently spreads to the regional cervical lymph nodes, the disease, nevertheless, will remain localized above the clavicle for months or even years. Hence there is a long, safe period of attack for eradication. Finally, and most important, a more complete removal of the regional node-bearing area "en masse" is possible in the neck than in any of the other node-bearing areas of the body. This is because the main lymphatic channels and lymph nodes accompany the major veins of the area involved.

If the nodes are involved with cancer, not infrequently the afferent and efferent channels are permeated with the disease and to a lesser or greater degree they are adherent to the associated vein. Many a surgeon, in attempting to save these vessels, has experienced the frustration of scraping or sharply dissecting these adherent nodes from the vein.

In the neck the internal jugular vein is relatively long and occupies the major pathway of the cervical lymphatics. Since this vein is excised from the level of the clavicle to well above the posterior belly of the digastric muscle in a radical neck dissection, and since the sternocleidomastoid muscle is also taken, it is possible to remove as a block of tissue practically all the lymph node-bearing area lying between the superficial fascia and the second layer of the deep cervical fascia. The first or enveloping layer of the deep fascia contains this mass of tissue and if the sternocleidomastoid muscle as well as the internal jugular vein is excised, this space need not

*• Simultaneous bilateral radical neck dissection is an operation entailing acceptable risk if used in properly selected cases. The procedure is indicated for patients with bilateral cervical lymph node metastases so situated that a two-stage radical neck dissection could not be done without cutting through cancer tissue. Such patients are those with intraoral or cervical visceral midline primary lesions or those in whom, either by direct extension or lymph node involvement, the submental and submaxillary triangles are solidly permeated with cancer. The operation is indicated only for cure; for prophylaxis or palliation, lesser or staged procedures would be more productive of better results with less morbidity and mortality.*

be entered except at the periphery of the dissection. In fact, during such a dissection the lymph nodes can frequently be palpated through the protecting layers of the surrounding fascia, but are usually never seen or individually exposed.

If a similar sacrifice of accompanying vein were possible in other node-bearing areas, such as the axillae, groins, iliac and aortic areas, the technical accomplishment of a "clean" and complete dissection in these regions could be attained. With the questionable exception of the axilla in some cases, this ideal situation has not been approached except in the neck.

A second fundamental principle in the surgical treatment of cancer is to avoid cutting through cancer tissue during its removal. In the past when both sides of the neck were involved with metastatic spread of cancer, a staged bilateral neck dissection was the accepted treatment, if cure were still possible. If the cancer in the neck intimately involved the anterior midline tissues (as is often the case), the surgeon carrying out this treatment either had to cut through cancer tissue in dividing the neck tissues for a staged bilateral neck dissection or limit the combined neck dissection on one side to a suprahyoid, supra-omohyoid or local excision of involved lymph nodes. He might even decide to do a bilateral suprahyoid neck dissection.

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All of those procedures are incomplete and dangerous, for they immediately jeopardize the patient's chances of ever receiving the benefit of a safe and complete block dissection of the neck, should there be recurrence. Such limited procedures in the neck terminate in the carotid triangle, and if lymphatic channels containing carcinoma are cut through at that point the recurrent growth will spread into the surgically opened field, through the destroyed protective fascial barriers, and become adherent to the carotid bulb and surrounding muscular floor of the neck. Such a recurrent situation is technically incurable by operation. Even if there is only a very small recurrent lesion adherent to the carotid bulb which can be removed by excising the bulb, the mortality rate associated with the operation is almost 60 per cent—and the chance of cure is less than it is with radical neck dissection which entails operative mortality of only 1 per cent.

To satisfy these fundamental principles of block dissection of a primary cancer and its immediate lymphatic drainage basin in certain midline lesions of the neck, it was necessary to extend the surgical management to include simultaneous bilateral radical neck dissection. Originally it was felt that the anatomical and physiological disruptions entailed in an operation of this magnitude were so great that it would almost certainly be fatal. No reports of an operation of this kind could be found in the medical literature. There were frequent references to simultaneous bilateral internal jugular vein ligation<sup>1</sup> and a few reports of excision of several centimeters of both internal jugular veins,<sup>2,3</sup> but such limited venous excisions and ligations are not comparable to the contemplated procedure.

The term radical or block dissection of the neck requires some definition. In this presentation it refers to the removal of all the venous and lymphatic systems between the superficial and third layer of the deep fascia of the anterior and posterior triangles of the neck, including the sternocleidomastoid and omohyoid muscles, as well as all or any part of the midline cervical viscera, if involved.

The feasibility of a staged bilateral radical neck dissection with an interval of one to three weeks has been adequately demonstrated.<sup>4</sup> It was presumed, however, that the simultaneous excision of the internal, external and anterior jugular veins with the connecting collateral tributaries and the encompassed lymphatic system from the mandible down to the clavicle would be incompatible with survival. Therefore, the operation was not only never seriously considered but the thought of it was even frowned upon. The literature contains many refer-

ences<sup>5, 6, 7</sup> to the impossibility of simultaneously eradicating so much of the cervical venous system, and despite current demonstration to the contrary, there are still frequent references to the hazard of removing both internal jugular veins in a two-stage block dissection of the neck. It can be well understood, therefore, why the consummation of this operation was so long delayed. The first successful result in simultaneous bilateral radical neck dissection was not attained until June, 1949.<sup>8</sup>

#### COLLATERAL CIRCULATION

Recovery after an operation of this scope is dependent primarily upon the potential capacity of the remaining venous channels to drain the cranial cavity and the dural sinuses. The vertebral veins of Batson<sup>9-13</sup> form the safeguard of this collateral return. This system of veins passes as a plexiform network, primarily in a vertical direction, both intraspinally between the dura and vertebrae and extraspinaly between the vertebrae and the erector spinae group of muscles.

By way of the foramen magnum, this system communicates with the occipital and basilar sinuses which connect with the major intracranial dural sinuses. Numerous basal skull emissary veins empty into this system through collateral tributaries. At all vertebral levels these vertical veins anastomose transversely with each other and with the intercostal and lumbar veins which connect, either directly or by way of the azygos system, with the caval venous system. This vertebral azygos-caval route provides a detour of venous return from the brain and cranial cavity to the right side of the heart. Usually the vertebral system of veins is constantly functioning and, owing to absence of valves and low venous pressure, the blood may travel in either direction.

Under abnormal conditions of obstruction to the superior caval veins, the carrying capacity of the vertebral system increases, as has been clinically demonstrated. Since both anterior facial veins are also ligated in this operation, the intracranial return of venous blood from the cavernous sinus and ophthalmic vein is blocked. In addition, the pterygoid and pharyngeal plexus, the superior and middle thyroid veins, the transverse cervical veins and the common facial veins with their posterior facial and occipital anastomoses are cut off from drainage into the jugular system. After operation, therefore, the only superior caval veins assisting the vertebral system are the inferior thyroid, deep cervical and vertebral tributaries of the subclavian and innominate veins and the transverse scapular veins by way of the shoulder and posterior neck regions.

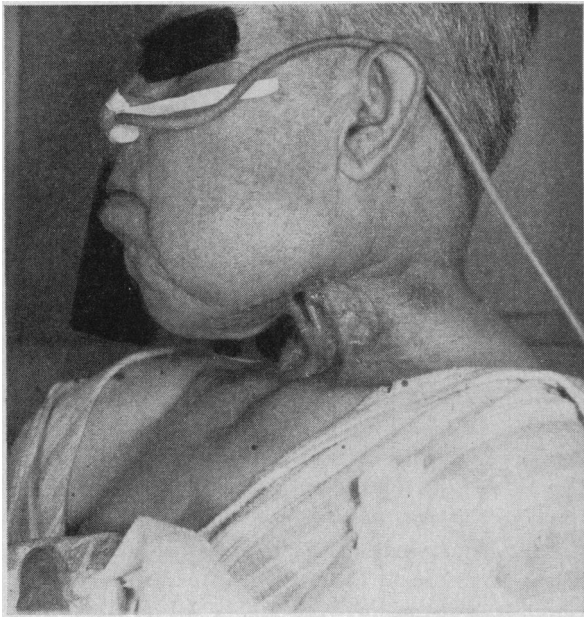


Figure 1.—Three months after operation. Pronounced lower jaw edema due to extensive removal of skin of neck with a midline visceral primary lesion and a simultaneous bilateral neck dissection.

#### MORTALITY

In the three cases in which the author has carried out simultaneous bilateral radical neck dissection, the patients survived the operation. Moore and Smith<sup>14</sup> reported their first successful result in a similar procedure done in August 1950. In an addendum to that communication they stated that they had since performed simultaneous bilateral radical neck dissection 12 times with one surgical death due to aspiration pneumonia on the ninth postoperative day. Morfit<sup>15</sup> likewise reported carrying out such an operation in December 1950 and the patient recovered.

#### COMPLICATIONS

The complications and sequelae are dependent on many associated factors such as previous operations, simultaneous removal of large portions of the arterial bed, excision of midline viscera with added destruction of the venous return, sacrifice of overlying skin, local changes caused by irradiation, and the general medical status of the patient. These factors cause a surprising variability in the postoperative changes. One patient may have fewer alterations than are usually seen after a unilateral block dissection of the neck, while another will have extreme edema of the lower jaw and face even after a year has elapsed (see Figures 1, 2 and 3). As a rule, with ligation of the second internal jugular vein, an immediate cyanotic edema appears about the face and particularly around the lower jaw. Within one to

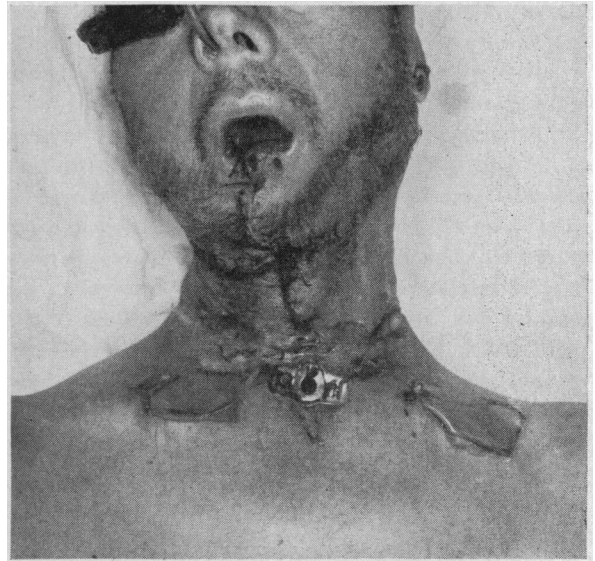


Figure 2.—Six days after operation. Minimal edema after removal of primary cancer of floor of mouth, tongue, and mandible with a simultaneous bilateral neck dissection.

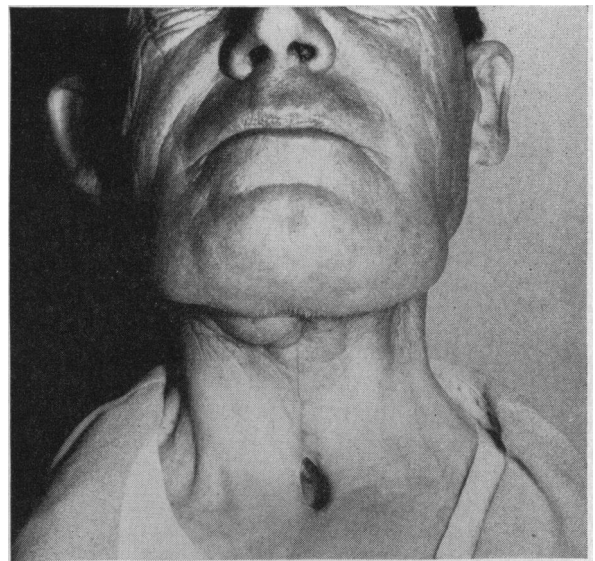


Figure 3.—Two months after operation. Minimal edema after excision of midline visceral primary cancer and simultaneous bilateral radical neck dissection. (Surgery, 31:297-306, 301, 1952.)

twenty-four hours the cyanosis may disappear. The edema begins to recede by the first postoperative day. There is a tendency, however, for the edema to be more pronounced and more persistent than that which commonly occurs following a two-stage procedure, but the difference is not too great or unacceptable. In cases in which a large amount of skin was sacrificed or midline viscera had to be removed, the cosmetic alterations were more pronounced. Some edema of the larynx occurred, as

was anticipated; tracheostomy was done routinely in all cases. No organic or functional alterations referable to the central nervous system were noted, nor were there visual disturbances.

Spinal fluid pressure was measured in one case. It more than doubled within 20 minutes after the second internal jugular vein was ligated. Ninety minutes later it returned to the preoperative level without the removal of any spinal fluid.<sup>16</sup> The increase in spinal fluid pressure was associated with a moderate rise in blood pressure, acceleration of respiration and a drop in the pulse rate, all of which were back to within the preoperative range at the termination of the operation. In the other two cases, one patient had a sharp rise in blood pressure and a drop in the respiratory rate with return to preoperative levels in one hour, while the other had practically no demonstrable variation in blood pressure, respiration or pulse throughout the entire operation. No spinal fluid was withdrawn from any of them.

It was not necessary to infuse supplementary Pentothal® until one to two hours after the second ligation. Similar lapse of time before need for additional infusion of an intravenous anesthetic agent has been noted frequently in association with long operations on the head and neck.

#### INDICATIONS

Simultaneous bilateral radical neck dissection is now well enough established as a safe operation to warrant consideration of specific indications for its use. Because of the increased cosmetic deformity, the greater destruction of the arterial supply with associated impairment of healing, the increased necrosis and fistulae formation and the factor of added surgical shock particularly as regards patients as debilitated as most of them are, this operation is not recommended as a routine procedure where bilateral radical neck dissection is contemplated. It should be given first consideration, however, if the primary lesion is at the midline and there is clinically observable bilateral involvement of lymph nodes such as to necessitate transecting the primary cancer or a definitely cancer-involved lymphatic area in order to carry out a staged operation. Such primary lesions are usually in the lower lip, floor of the mouth, tongue, inferior gingiva, cervical esophagus, larynx or thyroid. (See Figures 4 and 5.) If the primary lesion is in the thyroid and is small and laterally placed, a two-stage procedure should be the treatment of choice. When the primary lesion is controlled but the initial metastases involve all the submental and both submaxillary triangles and, as is usually the case, also the mandible, the one-stage

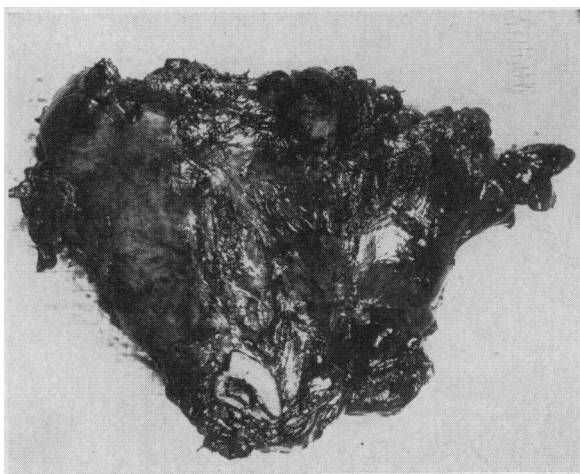


Figure 4.—“In continuity” specimen includes larynx, hyoid bone, base of tongue, pre-epiglottic space, strap muscles, preoperative tracheostomy stoma and tissues of the bilateral radical neck dissection.

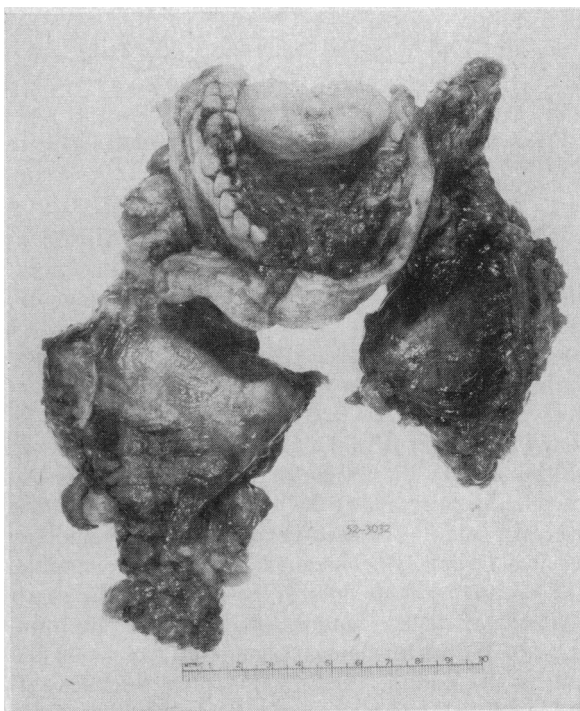


Figure 5.—Specimen of floor of mouth primary cancer with part of tongue and mandible and the tissues of the bilateral radical neck dissection.

procedure is better. Where an extensive primary cancer of the anterior floor of the mouth or tongue has invaded most of the inframandibular area and mandible, even in the absence of clinical evidence of lymph node involvement, the simultaneous procedure should be considered first. The use of the one-stage procedure is not warranted for elective (so-called prophylactic) bilateral neck dissection.

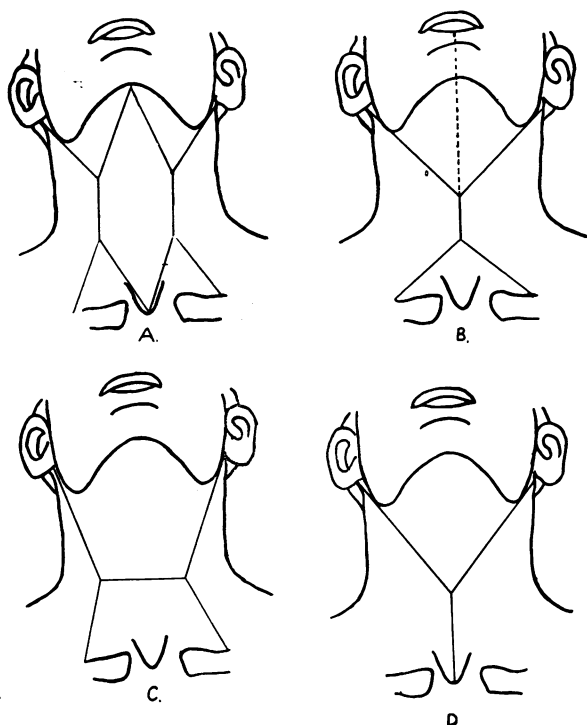


Figure 6.—Skin incisions for simultaneous bilateral radical neck dissection.

#### TECHNIQUE

The technique is no different from that utilized in routine combined primary excision and radical neck dissection except for the placement of the skin incision (see Figure 6). With intraoral lesions, a bilateral double "Y" skin incision could be used, leaving a wide attachment in the anterior vertical midline. The author has not used this incision, but it would seem that it might result in either limitation of the medial dissection of the neck or possible vascular impairment of the central skin flaps. Moreover, it could not be used in the presence of midline cervical lesions. A convenient incision is a double "Y" occupying both sides of the neck with the short vertical arm in the anterior midline. For intraoral primary lesions the upper triangular flap could be split in the midline through the entire thickness of the lower lip, and part of the lip removed if indicated. An "H" flap could probably be used, especially with thyroid, laryngeal or esophageal primary lesions. The author has used a single "Y" incision in operation for removal of a primary lesion of the larynx with satisfactory result.

In dealing with intraoral lesions, the dissections on both sides of the neck are done first and the excised tissues are left attached to the mandible without dissecting the submental or submaxillary triangles. The primary lesion is then excised with the mandible, cephalad and laterally, and removed "en masse" with the caudal attached neck tissues.

It probably is safer to dissect one side of the neck at a time and to tie the first internal jugular vein as early as possible, delaying the ligation of the second internal jugular vein in order to give several hours for development of the collateral venous return. Apparently there were no ill effects, however, when a team of surgeons worked simultaneously on opposite sides of the neck and the delay was not feasible.<sup>17</sup> Exploration of the side of the neck most involved or concerning which there is most doubt should be carried out first, so that if it is inoperable that fact can be learned as soon as possible. In dealing with midline visceral primary lesions, with the possible exception of some thyroid cancers, each side of the neck should be freed toward the midline before the primary laryngeal, pharyngeal or esophageal lesion is excised. The operation is terminated with a tracheostomy, adequate drainage and a single layer closure. A well applied pressure dressing is necessary.

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